Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Parts 1, 2, 22, 24, 27, 90 and 95	)	
of the Commission's Rules to Improve Wireless	)	WT Docket No. 10-4
Coverage through the Use of Signal Boosters	)	Released Apr 6, 2011
	)	
	)	
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EX PARTE COMMUNICATION
MILLARD/RAINES PARTNERSHIP
("SMART BOOSTER")

Smart Booster
Intelligent Cellular Range Extender

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Michael Millard and Jeremy K. Raines, Ph.D., P.E., inventors of the patented Smart Booster[1] Intelligent Technology hereby submit the following ex parte communication to WT Docket 10-4.

Boosters That are ON Where They Are Simply Not Needed Are a Demonstrated Guarantee for Interference.

Smart Booster remains steadfast that an effective technical safe harbor requires signal boosters to be OFF where they are simply not needed. Furthermore, when activated, boosters should be restricted to spectrum-specific operation, thus preserving carrier spectrum stewardship.

Given recent ex parte comments by others, it appears that at least some commenters are surprisingly unaware of exactly how modern wireless communications systems function. Put simply, in modern wireless networks, the handset output power is dynamically controlled by the network, in some cases up to 1500 times per second. The network instructs all handsets to simultaneously broadcast at an individually controlled power level such that all signals arrive at the various base stations with approximately the same minimum amplitude required for successful communication. Network capacity and spectrum efficiency are maximized only if this condition is met. This is an extremely complex arrangement since many networks are designed so that a given handset typically communicates with multiple cell sites simultaneously. This setup is NOT like the pioneer days of radio where “more power meant more distance”.

In fact, “more power” often means less distance, particularly for those suffering from booster-caused interference created by other users of the network. Under such conditions, subscribers broadcasting non-boosted signals near the edges of network design coverage can be expected to drop calls! **Operation of a signal booster where it is simply not needed has been conclusively proven in these proceedings to cause interference that shrinks the overall design coverage area of one or more affected cell sites.** Handsets already operating at maximum power cannot comply with network requests to “power-up” and “get in” over the booster noise and those calls are therefore dropped.

[1] US Patent 8,049,664, Issued Nov 1, 2011

The obvious conclusion from the above is that whenever a booster provides more power than the network requires for successful communication, **that in itself is a form of interference**. It does not matter how "watered-down" or "low power" the booster is made, or whether it has anti-oscillation circuitry or other technical safe harbors. The mere fact that a signal booster is operable at locations where boosting is not needed is enough to deprive networks of their design capacities resulting in diminished service to subscribers. In large enough numbers, unrestrained signal booster use threatens the integrity of the entire wireless network.

Some commenters would have you believe that "well-designed" signal boosters can be operated anywhere without risk of interference to the networks. This is simply not true. A "well designed" signal booster must be smart enough to know when to turn itself OFF, and that capability is the **key technical safe harbor missing from the Joint Proposal.**

Equally important, the various carrier networks are each configured differently, with base stations constructed in geographically disparate locations, using different signaling protocols and undergoing constant evolution. Consequently, the "well-designed" booster necessarily limits its operation to only those networks which actually require amplification when and where it is needed. Likewise, there is no compelling justification to eviscerate carrier spectrum stewardship to allow signal booster use with impunity when the actual need for signal boosting is dependent upon a specific network's topology.

Wilson Makes Assertions about the Sleek Booster That Contradict Its Own Published Literature.

The extent to which some proponents of the Joint Proposal will go to defend a questionable design that lacks this basic on/off technical safe harbor protection is astonishing. In its ex parte notice of March 1, 2012, Wilson Electronics explicitly states that their Sleek model signal booster is compliant with the Joint Proposal's currently proposed requirements for consumer boosters.[2] However, when confronted with evidence that the same Sleek booster caused actual real-world interference to at least two competitor's cell sites, the story changes. Wilson now

[2] Ex parte communication of Wilson Electronics, March 1, 2012, "Consumer Booster Improvement of Cell site Coverage", page-3, section-5.

claims that the Sleek booster does not in fact have the anti-oscillation protections it advocates for "well-designed" boosters compliant with its own Joint Proposal.[3]

Whether or not anti-oscillation protections exists in the Sleek booster is irrelevant. As measured, the interference caused by the Sleek booster does not appear to be of the type that such anti-oscillation circuits are designed to prevent.

The Sleek's User Manual, as well as the manufacturer's web site for the Sleek product, clearly indicate that the device in question has anti-oscillation protections.[4, 5] This apparent contradiction in the Sleek design is perplexing, and may simply indicate a desire to legitimize that product and sell it to the public in large numbers without regard to factual accuracy in these proceedings.

Wilson Makes Assertions about the Sleek Booster That Defy the Physics of Radio Propagation.

In another example of inconsistent technical assurances, Wilson's expert claimed the device could reliably amplify a signal through 7-1/2 miles of solid rock – after that signal had already traversed more than a dozen miles![6] This claim is preposterous.

In addition to these exaggerated claims of coverage improvement, Wilson has repeatedly made assurances, both in these proceedings and to the general public, that their products are "20x more powerful" than a handset alone. Let's look at this claim in more detail:

The discussion below considers the Motorola Droid Razr handset used in Wilson's own coverage test described above, even though it is not the most powerful handset available on the

[3] Ex parte communication of Wilson Electronics, July 20, 2012, "Comments Regarding Smart Booster Ex Parte Communication Submitted July 19, 2012", ¶-1, pg 3.
[4] Wilson Electronics Sleek Installation Manual, "Understanding the Sleek® Lights", pg 4. Document available online at: http://www.wilsonelectronics.com/uploads/docs/SLEEK_4GV_4GA_IG_070612.pdf
[5] See link: http://www.wilsonelectronics.com/ProductDetails.aspx?Product=16&Category=7
[6] Ex parte communication of Wilson Electronics, March 1, 2012, "Consumer Booster Improvement of Cell Site Coverage", pages 8 and 10.

market today.[7] The maximum output power of the Droid Razr handset is tabulated in Motorola's OET Test Report filed with the Commission: [8]

CDMA-800 Maximum ERP = 25.9 dBm
CDMA1900 Maximum ERP = 27.50 dBm

If Wilson's claims of "20-times more powerful" were true, their booster would be capable of broadcasting a signal at least as powerful as 27.5 dBm x 20 or about 40.5 dBm. This value is equivalent to about 11.25 watts and greatly exceeds the 2-watt maximum handset output power permitted by FCC Rule 24.232(c).

So what does Wilson actually mean when they claim their boosters are "20-times more powerful" than a handset alone? The answer may surprise some:

In order for Wilson's claim to be true, the handset must be operating at MINIMUM output power. If you were to multiply that minimum output power by a factor of 20, one might get reasonably close to the Sleek's published output power. The problem of course is that Wilson completely ignores the fact that a handset broadcasting at minimum output power is already in extremely close proximity to the carrier's base station and, therefore, **does not need to be boosted in the first place!** And even if it did require amplification, the handset alone is more than capable of providing the needed "boost".

Of the Three Competing Technologies for Signal Boosters, Only One Is Mobile and Is OFF Where It Is Not Needed.

Recently, a few of Smart Booster's comments have been misconstrued by other commenters in these proceedings. The following is intended to clarify our position regarding those issues:

AT&T, in its ex parte of July 20, 2012, implies that Smart Booster is against the technical safe harbors contained in the various versions of the Joint Proposal. This is inaccurate. While we agree that technical safeguards are desirable, they are insufficient as they currently exist to stop the interference problem. Furthermore, the low power nature of the Joint Proposal

[7] See link: http://en.wikipedia.org/wiki/Droid_RAZR
[8] See link: https://apps.fcc.gov/eas/GetApplicationAttachment.html?id=1560532

recommendation is inadequate to provide robust coverage to rural and underserved America – even if the interference those boosters would cause could somehow be eliminated.

Fundamentally, a modern wireless network functions by dynamically controlling the radiated output powers of all handsets simultaneously across numerous cell sites. The network is designed to provide this control to handsets, but not to boosters, not even intelligent boosters. The network signaling protocols simply can't do it. As a result, whenever this delicate balance is upset by booster interference, network coverage and capacity decreases (sometimes dramatically), data rates slow to a crawl, and calls are dropped.

The inability of the network signaling protocols to dynamically control the combination of a booster plus handset (or booster plus many handsets, each potentially operating on different networks), has led to the development of the following three competing strategies.

1. Intelligent booster technology:

Intelligent boosters provide for effective and meaningful signal amplification via the combination of GPS-controlled band-specific operation, and an updateable memory card similar to those used in many digital cameras. The memory contents of this card instruct the intelligent booster to be operational only at the times, locations, output power and spectrum deemed appropriate by the serving carrier. This arrangement preserves carrier spectrum stewardship. The intelligent booster will not operate without a valid, unexpired memory card installed. Upon expiration, replacement memory cards are installed that reflect any changes to the network. The carrier determines the update interval. Thus, any booster registration required as a result of these proceedings would be automatically satisfied, and kept current, as subscribers periodically update or replace their booster's memory card. **Intelligent boosters do not require "license by rule**".

2. 5 GHz UNII approaches:

Nextivity has developed an interesting work-around for the inherent inability of wireless networks to effectively communicate with boosters. As we understand the technology, the Nextivity approach is a two-box solution that provides a translated 5 GHz UNII radio path between the handset and the network. The Nextivity device claims to intercept the carrier's signaling protocol and in this way "knows" what power level and spectrum is required. Like intelligent boosters, this approach preserves carrier spectrum stewardship. The disadvantage is

that a meaningful loss value on the 5 GHz UNII link cannot be reliably obtained in a mobile environment, such as a vehicle, limiting the device to fixed or in-building applications. Smart Booster supports the Nextivity approach because it is carrier-specific and has appropriate technical safeguards to limit interference. **The Nextivity approach does not require "license by rule".** Note, however, that Nextivity does not offer a mobile booster that would provide reliable wireless communication for rural subscribers in their vehicles or otherwise in transit.

3. Downlink Signal Sensing approaches:

Proponents of the Joint Proposal champion a method best described as downlink signal sensing. Using a proprietary algorithm, which may or may not be valid for future networks, this solution theoretically allows boosters to independently decide how much power to emit based on how far away it believes the nearest base station is located, regardless of network affiliation or actual need for signal amplification. There is no provision to prevent the "Swiss Cheese" coverage that results from this implementation, and because it is a broadband method, it eviscerates carrier spectrum stewardship. **This Joint Proposal solution is a broadband approach that requires a License by Rule framework**.

The Regulatory Steps Necessary to Prevent Interference While Providing Signal Boosters to Rural America Are Clear.

Smart Booster has consistently recommended the following regulatory steps, which have been suggested in several previous filings.

1. Amend Rule 22.923 to permit boosters to be inserted between handsets and base stations, and update certain of its definitions.

2. Require all boosters to have a minimum amount of intelligence so that they know where to amplify, when to amplify, how much to amplify, and within which spectrum blocks to amplify.

3. Require that all intelligent boosters have a provision to guarantee they are registered and that their ability to adjust power levels remains accurate and current.

4. Decertify all boosters that do not meet the above minimum requirements, including broadband boosters.

5. Require networks to support intelligent boosters by providing databases appropriately encoded on a compatible memory card in a timely manner.

Respectfully submitted,

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FCC 2.803 Compliance Notice:

Prototype - Not for Sale
The Smart Booster device has not been authorized as required by the rules of the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased, until authorization is obtained.

Intellectual Property Notice:

Smart Booster™ and the Smart Booster logo are trademarks of the Millard/Raines Partnership.
The Smart Booster device has been awarded US Patent # 7,579,783. Additional patents are pending.

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